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Adopting Organic Agriculture: An Investigation Using the Theory of Planned Behaviour

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Poster paper prepared for presentation at the International Association of
Agricultural Economics Conference, Gold Coast, Australia,
August 12-18, 2006

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1 Introduction

Organic agriculture is frequently promoted as an exit strategy from poverty for small-scale marginal producers in developing countries. Potential benefits include premium prices for produce and a range of environmental and social gains. However, in the absence of external assistance, adoption has been slow and promotion and research into sustainable technologies has had little impact on its adoption.

While the economics literature suggests that a lack of profitability and credit constraints are the main problems facing their adoption (Cary and Wilkinson, 1997), the literature on the adoption of sustainable agricultural technologies is inconclusive. It agrees with the psychology literature in suggesting that attitudes towards the environment and degree of effort necessary to carry out the action need to be more fully understood (Edwards-Jones *et al.*, 1998; Saltiel *et al.*, 1994).

It has long been recognised in the economics of consumer behaviour that subjective preferences of the individual and his/her perceptions to a product influence its demand (Basmann, 1956). Farmers, as consumers of agricultural technologies, will therefore have subjective preferences to the technology options available. Usually in agricultural technology adoption studies, no specific framework is given to the attitude problem, it is dealt with by simply adding a few questions into the survey instrument. They therefore fail to appreciate the full complexity of attitude development and its association with behaviour.

As ecological behaviour is susceptible to a wide range of influences beyond an individual's control, Kaiser *et al.* (1999) state that environmental attitude alone is a poor predictor of behaviour. They therefore promote the Theory of Planned Behaviour (Ajzen, 1988) for studies in the ecological domain. Using small-scale avocado producers (< 15ha) from Michoacán, Mexico as a case study, psychological barriers to the adoption of organic agriculture are explored. The following briefly introduces the Theory of Planned Behaviour (TPB), describes the data used in the ordered probit model and outlines the methodology used to implement the model. The results are then presented, followed by a discussion and conclusions.

2 The Theory of Planned Behaviour

TPB states that attitudes alone are not sufficient to predict behaviour, but that social pressures and the perceived difficulty in carrying out the action are also important. Developed from the expectancy-value model (Fishbein, 1963) and the theory of reasoned action (Fishbein and Ajzen, 1975), TPB regards beliefs as the fundamental blocks of behavioural intentions. They represent the information an individual has about a specific behaviour and the attributes of this behaviour. Three different types of beliefs are distinguished: behavioural beliefs, normative beliefs and control beliefs, all of which are underlying, cognitive structures.

These beliefs are considered indirect influences on behavioural intention. Intention itself is mediated through the direct latent factors: attitudes, subjective norms and perceived

behavioural control, aggregations of the different beliefs. Using the expectancy-value framework, attitudes A , are assumed to be formed from behavioural beliefs b_i , or expectations about the likelihood that an outcome is associated with an action, weighted by the evaluation e_i , of these outcomes, where $A \propto \sum_{i=1}^r b_i e_i$. Subjective norms SN , are constructed from normative beliefs n_i , which are weighted by the motivation to comply with them m_i , where $SN \propto \sum_{i=1}^r n_i m_i$; and perceived behavioural control PBC , is the result of the control beliefs p_i , an individual has that some factor aids an action, weighted by the access c_i , an individual believes he or she has to that factor, where $PBC \propto \sum_{i=1}^r p_i c_i$. Individuals differ through the evaluation of these beliefs and the strength with which they believe them.

TPB assumes individuals do not have full volitional control over behavioural actions, but that the PBC component can be used as a substitute for a measure of actual control (Ajzen, 1988). TPB therefore suggests that the more positive the attitude, subjective norm and perceived behavioural control, the greater the likelihood an individual has of intending to carry out the behaviour when the opportunity arises. Figure 1 illustrates how TPB considers behavioural intentions to be formed.

[insert figure 1 about here]

Ajzen (2001) considers other factors that might be assumed important to the formation of intentions, such as demographic characteristics and prior experience to be already incorporated into TPB. Such factors will be interpreted and used to update attitudes and

beliefs, which will then influence behavioural intentions. It is therefore expected that effective communication can be used to modify behaviour. The inclusion of demographic factors in the analysis, however, will assist in targeting interventions based on TPB results.

3 The survey data

The data were collected in two stages during 2004. The first stage involved 32 semi-structured interviews with key individuals in the avocado industry: organic and conventional avocado growers, members and staff from avocado producers' associations, buyers and packers of avocados, organic certification agencies, researchers and government officials. These interviews were used to elicit modal salient beliefs, the most important shared beliefs about organic production found in the population of interest. The beliefs that were repeated frequently by the interviewees were then included in the questionnaire used in a household survey of 233 small-scale avocado producers including 186 conventional (non-adopters) and 47 certified organic (adopters) growers.

The TPB section of the questionnaire consists of one question regarding intention to convert to certified organic production within the next year, five questions measuring attitudes, two measuring subjective norm and two measuring perceived behavioural control. Indirect measures were only constructed for behavioural beliefs and control beliefs, both consisting of four paired questions. While it is necessary to measure all the direct factors (attitudes, subjective norm and perceived behavioural control), it is not necessary to measure all the indirect factors (behavioural beliefs, normative beliefs and control be-

liefs). Normative beliefs were excluded as the initial interviews suggested that organic production was not well known outside producer and agronomist circles.

Questions were then scored by offering respondents a number of choices (e.g. from strongly agree to strongly disagree) measured on a five point uni-polar scale. To understand how each of these components affects the intention to produce organic avocados, the weight of each component is calculated using an ordered probit model. As interest lies in barriers to adoption and as beliefs can be expected to change with experience, comparisons between organic and conventional producers appears unfair. The conventional farmers, in terms of their potential to adopt therefore become the more interesting case. The ordered probit models are therefore run on a reduced data set of 108 conventional farmers, removing the organic producers, those who have not heard of organic production and those with missing data.

4 Modelling producer intentions

In the ordered probit model the dependent variable, intention to adopt or y_i , is divided into j ordered categories, where $j = 5$ is equivalent to a strong positive intention and $j = 1$ is a strong negative intention. The j ordered categories of the dependent variable are assumed linked to a latent variable z_i , that is normally distributed. The relationship between z_i and the independent variables is represented by:

$$z_i = \mathbf{x}_i' \boldsymbol{\beta} + \varepsilon_i \quad (1)$$

where \mathbf{x}_i is a n by k matrix of explanatory variables, $\boldsymbol{\beta}$ is a k by 1 vector of unknown coefficients to be estimated and ε_i is a normally distributed random error term. The relationship between the observed y_i and latent z_i is given by:

$$y_i \begin{cases} = 1 & \text{if } z_i \leq \gamma_1 \\ = 2 & \text{if } \gamma_1 \leq z_i < \gamma_2 \\ = 3 & \text{if } \gamma_2 \leq z_i < \gamma_3 \\ = 4 & \text{if } \gamma_3 \leq z_i < \gamma_4 \\ = 5 & \text{if } z_i \geq \gamma_4 \end{cases} \quad (2)$$

Here γ_j is an unobserved boundary parameter, indicating into which ‘bin’ the z_i values should fall. To avoid an identification problem, the γ values are restricted to $\gamma_0 = -\infty$, $\gamma_1 = 0$ and $\gamma_j = +\infty$. The probability that $y_i = j$ is given by:

$$\Pr(y_i = j | \boldsymbol{\beta}, \boldsymbol{\gamma}) = \Phi(\gamma_j - \mathbf{x}_i' \boldsymbol{\beta}) - \Phi(\gamma_{j-1} - \mathbf{x}_i' \boldsymbol{\beta}) \quad (3)$$

Estimates of the location and scales of the unknown $\boldsymbol{\beta}$ coefficients and the boundary parameters γ_j are obtained using a Gibbs sampler run for 25 000 iterations following Albert and Chib (1993). The posterior mean estimates of $\boldsymbol{\beta}$ indicate the direction in which explanatory variables influence the intentions to adopt organic production. Their relative importance is shown by the highest posterior density interval (HPDI). HPDIs that do not cross zero indicate the statistical significance of the variable. To allow for model comparison the log marginal likelihood is also obtained using the method of Chib (1995) and the odds ratio in favour of the model with the smallest log marginal likelihood is calculated.

5 Results

Three ordered probit models are run, one including only the TPB constructs and the others containing the additional variables of age and education respectively. The values for attitude and perceived behavioural control included in the models are mean values obtained from the expectancy-value scores of the indirect measures of behavioural beliefs and control beliefs (see section 2). Only the behavioural belief and control belief questions that were found to correlate with their corresponding direct measures were used to calculate the means. The measure for subjective norm, however, is a direct measure, as mentioned above.

Descriptive statistics indicate that intentions are negative towards adoption with a mean score of 2.5. Attitudes (via behavioural beliefs) are very positive, with 94 percent having a behavioural belief score between 4 and 5. Both subjective norm and perceived behavioural control are somewhat neutral: 94 percent of respondents have subjective norm scores between 2 and 4 (although only 10 percent actually scores of 3), and 78 percent have perceived behavioural control scores (via control beliefs) between 2.5 and 3.5. The mean age of conventional growers is 54 years with the mean education level being 1.3, indicating little more than primary education¹. Overall, this suggests that any immediate conversion to organic production is unlikely, at least in the coming year.

The ordered probit model outputs confirm this result (see table 1). Despite the fact that

¹The education variable was scored on a five point scale where 0=none, 1=primary, 2=secondary, 3=tertiary and 4=degree level and over.

attitudes are positive towards organic production, they have a negative and insignificant influence on the intention to convert, illustrated by the 95 percent HPDI for this variable crossing zero. More important to the formation of intentions are the perceived social pressures (subjective norm) and perceived ease of conversion (perceived behavioural control), both having positive and significant effects on intention. Age and education are also significant to the formation of intentions with age having a negative effect and education having a positive effect (at the 90 percent level). It is interesting that in the model including education, perceived behavioural control is not significant, suggesting some level of interaction between these two variables. On calculating the log marginal likelihood scores for the three models (model 1: -230.44, model 2: -231.70 and model 3: -238.16), the model containing just the TPB constructs (model 1) has the strongest likelihood of being the true model. The odds in favour of model 1 over models 2 and 3 are 3.53 and 2252.96 respectively.

[insert table 1 about here]

6 Discussion

The negative and insignificant affect of attitudes towards conversion to organic production found here is interesting. It suggests that farmers have an interest in conversion, but for reasons expressed below, are unable to convert. However, the literature investigating the role of attitudes towards environmental behaviours is ambiguous to its importance (see for example Beedell and Rehman, 2000; Kaiser *et al.*, 1999). The attitudes professed

here may partly be a consequence of the ‘socially acceptable response’. Individuals may be aware of the positive attributes of organic agriculture, such as potential environmental protection, and so may respond that organic production is good as social consciousness dictates this is important. Nevertheless, the component questions used to measure the attitude construct include the benefits of organic production on family health, the benefits to the environment and increased prices. These are the main promotional points used to encourage conventional farmers to convert to organic production and are the key reasons given by organic producers for adopting organic methods. This result gives clear evidence that positive attitudes alone are not sufficient to encourage adoption.

Subjective norm has a positive and significant affect on the formation of negative intentions. The main source of management information may help explain this. The principal information source for avocado producers is an agronomist from an input supply outlet. As very few are effectively trained in organic techniques, the majority of agronomists can only supply conventional management information. Organic production information must be actively searched for. As the score used for subjective norm is derived from the direct measure, its significance provides a case for disaggregation of this construct and measurement of normative beliefs in future studies. Despite information sources being limited, as awareness increases, organisations such as producers’ associations and the government phytosanitary body may also influence the intentions to adopt organic methods.

This study also shows that the perceived ability a producer has to successfully convert to organic production is an important influence on the formation of intentions, with most pro-

ducers having negative perceptions. The perceived behavioural control construct relates to perceptions about certification costs and knowledge of organic production methods. Their significance suggests that credit constraints and a scarcity of information are key barriers to adoption. Lynne *et al.* (1995), for example, promote the use of strategies such as incentives and external control (e.g., regulation) for the adoption of environmental behaviours. While organic production has a ‘built-in’ incentive in the form of premium prices, these results suggest that the present premium of between 20 and 30 percent is insufficient. This demonstrates that risk perceptions to organic production differ among producers, as do responses to perceived costs and incentives. Social pressures and perceived inability to be successful offset the incentive of premium prices.

The results from the ordered probit models also show that both age and education influence the intention to produce organic avocados. The adoption literature supports the idea that age often exerts a negative influence on adoption decisions, and education a positive effect (see for example Feder *et al.*, 1985). Any promotion of organic production to avocado producers based on these result show that intervention would be most effectively targeted at younger, more educated farmers.

7 Conclusions

The results presented here indicate that large-scale conversion to organic production is unlikely in the short term. Attitudes, whilst positive are not sufficient to induce adoption. They are overridden by a perceived inability to convert successfully and social pressures

from important referent groups. Psychological factors are therefore significant barriers to adoption.

TPB assumes that effective communication is an efficient method for influencing beliefs and therefore intentions. Using the positive attitudes as a foundation, if organic production is to be encouraged among avocado producers, action and activities need to be targeted at specific actors and importantly at the actors with the greatest impact in the chain. This may be up the chain, in terms of agronomists and input suppliers but given the consumer-driven nature of the organic movement, awareness raising must also focus on the purchasers of the fruit.

An enabling environment must also be promoted, focusing on producers' ability to adopt. This may be assisted by practical workshops for producers, but also by a quality supply of organic inputs. It further supports the case for training more agronomists and creating new information sources in organic, or ecological, production methods, but also cost cutting efforts such as group certification. This will be especially important for the marginal producers that the organic movement wishes to assist.

Acknowledgments

This work has been funded by an Economic and Social Research Council (ESRC) post-graduate studentship and reports results from the author's doctoral research. Thanks are given to Dr Garth Holloway for statistical advice and Dr Mario Mazzocchi for guidance

with the theory of planned behaviour.

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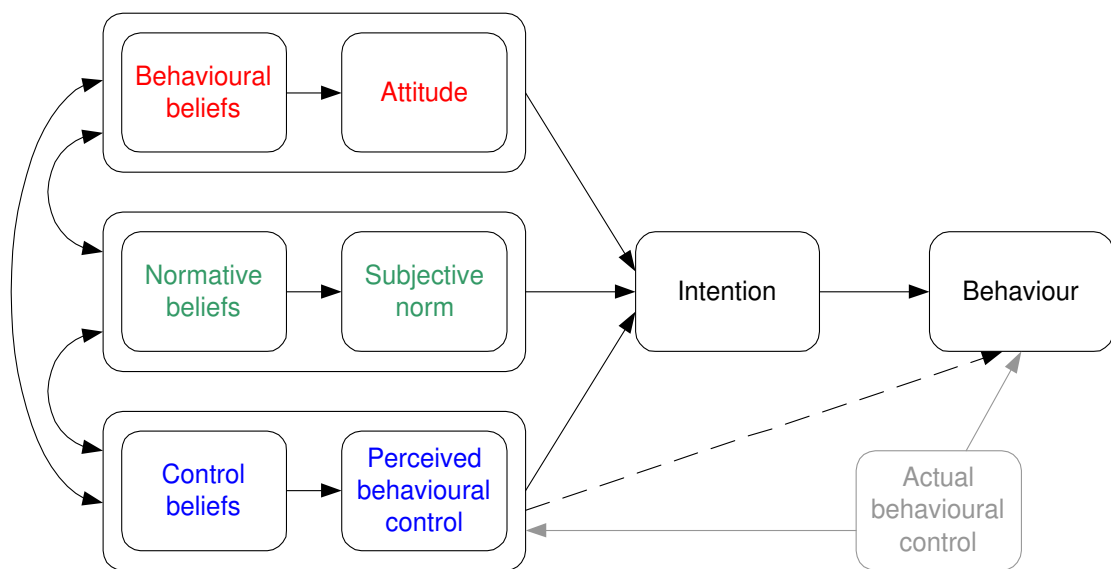


Figure 1: Conceptual framework for the Theory of Planned Behaviour (Azjen 1988, p. 133).

	Model 1		Model 2		Model 3	
	posterior	highest posterior	posterior	highest posterior	posterior	highest posterior
variable	mean	density interval (95%)	mean	density interval (95%)	mean	density interval (95%)
CONSTANT	0.26	(-1.32 1.85)	0.51	(-1.12 2.09)	0.27	(-1.31 1.88)
SN	0.23	(0.02 0.44)	0.23	(0.02 0.44)	0.21	(0.00 0.42)
ATT	-0.40	(-0.84 0.05)	-0.30	(-0.77 0.15)	-0.35	(-0.80 0.10)
PBC	0.54	(0.04 1.05)	0.52	(0.02 1.02)	0.42	(-0.10 0.93)
Age	-	-	-0.01	(-0.03 0.00)	-	-
Education	-	-	-	-	0.18	(-0.01 0.39)

Table 1: Ordered probit models: TPB,TPB with age and TPB with education. Numbers in bold illustrate significant posterior means, confirmed by their highest posterior density intervals (95%) not crossing zero. At the 90% level, the education variable is also significant.